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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/729,343	10/16/1996	DOSUK D. LEE		3866

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EXAMINER	
GOLLAMUDI, SHARMILA S	
ART UNIT	**PAPER NUMBER**
1616	

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	08/729,343	LEE ET AL.	
	Examiner	Art Unit	
	Sharmila S. Gollamudi	1616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,7,9-16 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,7,9-16 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Receipt of Request for Continued Examination, Amendments, and Remarks received on May 24, 2004 is acknowledged. Claims **1, 3, 7, 9-16, and 25** are pending in this application. Claims 2, 4-6, 8, 17-24, and 26 stand cancelled.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3, 7, and 9-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. Claim 1 recites "as shown in Figure 3c". This claim is an omnibus type claim.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3, 7, 9-16, and 25 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-14 of U.S. Patent No. 6,214,368, claims 1-2 of U.S. Patent No. 6,132,463, claims 1-21 of U.S. Patent No. 6,027,742, claims 1-9 of U.S. Patent No. 6,331,312 are maintained for the reasons set forth in the Office Action of April 23, 2003.

Note that the rejection over US patent 6,287,341 is withdrawn.

Response to Arguments

Applicant has neither argued the merits of the rejection nor has the applicant filed a Terminal Disclaimed. Therefore, the rejections are maintained.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims are 1, 3, 7, 9-16, and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by US patent 5,782,971 to Constantz et al.

Constantz et al teach a flowable amorphous calcium phosphate (ACP) composition capable of setting in vivo (endothermic process) into a shaped product. The paste contains in addition to ACP, a monocalcium phosphate (acidic calcium phosphate), and a liquid (sterile water). See column 4, lines 5-52 and column 5, lines 45-55. The paste like composition has approximately the crystallinity of natural bone. See column 2, lines 40-42 and lines 50-53. The calcium phosphate has a molar ratio about 1.5 to 1.8 and preferably 1.6 to 1.7. See column 3, lines 18-21. The compositions reabsorbed by the body from two weeks to 48 months. See column 6, lines 17-20. The setting time take at least about 10 minutes and not more than about

60 minutes. Instant setting times are taught in Table 1. The composition is used for a variety of purposes, i.e. connective tissue replacement, bone cementing, as a prosthetic implant, as a dental implant, as bone filler, as a means of bonding bone fragments together in a fracture, etc. see column 6, lines 55-66.

Although Constantz does not specify the x-ray pattern in regards to claim 1 and those claims depending from it, it is the examiner's position that the prior art has the same differential pattern as that of instant invention. The applicant claims a diffraction pattern that of natural bone and Constantz teaches a material that has approximately the crystallinity of bone. Therefore, since the diffraction pattern measures crystalline nature of the material and the conversion of the precursor material to hydroxyapatite, it's the examiner's position that Constantz material would have the same pattern. Note that the prior art meets the limitation of "poorly crystalline apatite" as defined by the specification wherein at least one gram of PCA material is implanted, undergoes ossification in the body, and is resorbed.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 25 is rejected under 35 U.S.C. 102(b) as being anticipated by RE 33,221 to Brown et al.

Brown et al disclose a dental restorative cement pastes. The cements are used for conventional purposes, i.e. to fill a tooth socket, a replacement cone, a cement for implanting and replanting teeth, a material which promotes bone growth, etc. see column 9, lines 20-40. The composition is a mixture of two sparingly soluble calcium phosphates and a dilute aqueous solution. The combination hardens into dental cement when contacted with living tissue. See abstract. The CaP mix contains teteracalcium phosphate and at least one sparingly soluble

calcium phosphate, i.e. dicalcium phosphate dehydrate or brushite. See column 3, lines 35-50. The composition may be in a slurry, gel, cement, or injectable form. See example 3. Table II provides the instant setting times. Brown et al disclose methods of manipulating setting times by adding a sizable amount of hydroxyapatite seed crystals to the paste to facilitate crystal formation. Further, crystal habit modifiers such as magnesium, citrates, or phosphonates may be used to promote expansion and adhesion. These modifiers absorb onto the specific sires of the crystal surfaces during growth affecting the morphology of the crystals. Further, appropriate combinations of varying particle sizes promote setting expansion. See column 9, line 55 to column 10, line 5. Example 3 further teaches the manipulation of the setting time. The rate of remineralization may also be adjusted which effects the body's ability to resorb the material. Therefore rapid mineralization is beneficial under some circumstances such as incipient dental caries and lesions. Slow mineralization is beneficial for deep lesions. See column 8, lines 25-47.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3, 7, 9-16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 94/02412 to Simkiss et al.

Simkiss et al teach an amorphous calcium phosphate that hardens to form bone in vivo. See abstract. The precursor material is applied to the site where bone growth is required. See page 3. Simkiss teaches hydroxyapatite Ca5(OH)PO4)3 on page 1 as the inorganic material of choice. The molar ratio of Ca to P is 1.67. Tricalcium phosphate is also taught which has a molar ratio of 1.5. Negligible amounts of magnesium in the composition (as low as 0.001 moles for 1 mole calcium). It should be noted that compositions containing hydroxyapatite or tricalcium phosphate having magnesium and tricalcium phosphate are known to be resorbable. Simkiss exemplifies a material wherein the material is hardened after "many hours". See page 4. However, Simkiss also teaches the ability to modify the transformation rates when the material is exposed to body fluid, by including crystallization inhibitors such as pyrophosphate or magnesium ions in certain proportions. See page 2, last paragraph. Simkiss teaches the precursor material contains the inhibitors in low levels, which inhibit the crystallization of the material, and when the implant is in vivo, the inhibitors are leached away by body fluid, thus causing the precursor material to undergo transformation into crystalline hydroxypatite. See page 3. On page 6, Simkiss teaches transformation time can be controlled by the choice of inhibitor and the choice of inhibitor concentration and/or solubility. A slow mechanism is taught as one requiring natural bone formation and repair mechanism. However, fast-setting material may be used depending on the intended use such as bone filling or bone-grafting. See page 6. X-ray diffraction patterns are seen in Figure 1.

Simkiss does not teach the recited setting time.

However, it is deemed obvious to one of ordinary skill in the art at the time the invention was made to look to the guidance provided by Simkiss and formulate a fast-setting precursor material. One would be motivated so depending on the intended use of the implant. For instance, Simkiss teaches the use of fast setting for uses such as bone filling whereas if natural bone formation is desired, one would utilize a slow-setting material. Therefore, the motivation to manipulate the parameters of the prior art depends on the intended use of the implant and treatment plan.

Furthermore, Simkiss provides guidance on how to formulate the desired setting rate by stating that a higher concentration of crystallization inhibitor provides for a slow-rate and less of the inhibitor provides for a fast rate.

It should be further noted that the instant claims recite "hardened within..." but do not recite the degree of hardness. For instance, Simkiss exemplifies a product that takes hours to completely hardened, however the beginning hardening process could fall within applicant's range.

Lastly, it should be noted that it is the examiner's position that since Simkiss teaches similar precursor material without distinction, the functional limitation, i.e. the resorption rate will be implicit. However, if applicant argues otherwise, then the applicant has the burden of proving otherwise.

Response to Arguments

Applicant argues that Simkiss does not anticipate the instant invention. Applicant argues that Simkiss is not obvious over instant invention either since Simkiss fails to teach a material

that hardens within 10-60 minutes. Further, it is argued that Simkiss only teaches slow hardening material and not the instant fast hardening material. Lastly, it is argued that Simkiss does not even suggest a fast hardening material.

Applicant's arguments have been fully considered but they are not persuasive. Firstly, it should be noted that the anticipatory rejection has been withdrawn in view of the amendments filed May 24, 2004. However, it is the examiner's position that Simkiss suggests the instant invention since clearly as discussed above, Simkiss not only provides motivation when to use a slow setting material versus a fast setting material but discloses that crystallization inhibitors and their concentrations modify the hardening rate. Therefore, the instant invention is viewed as prima facie obvious.

Claims 1, 3, 7, 9-16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 94/02412 to Simkiss et al by itself or in view of RE 33,221 to Brown et al.

Simkiss et al teach an amorphous calcium phosphate that hardens to form bone in vivo. See abstract. The precursor material is applied to the site where bone growth is required. See page 3. Simkiss teaches hydroxyapatite Ca5(OH)PO4)3 on page 1 as the inorganic material of choice. The molar ratio of Ca to P is 1.67. Tricalcium phosphate is also taught which has a molar ratio of 1.5. Negligible amounts of magnesium in the composition (as low as 0.001 moles for 1 mole calcium). It should be noted that compositions containing hydroxyapatite or tricalcium phosphate having magnesium and tricalcium phosphate are known to be resorbable. Simkiss exemplifies a material wherein the material is hardened after "many hours". See page 4. However, Simkiss also teaches the ability to modify the transformation rates when the material

Is exposed to body fluid, by including crystallization inhibitors such as pyrophosphate or magnesium ions in certain proportions. See page 2, last paragraph. Simkiss teaches the precursor material contains the inhibitors in low levels, which inhibit the crystallization of the material, and when the implant is in vivo, the inhibitors are leached away by body fluid, thus causing the precursor material to undergo transformation into crystalline hydroxypatite. See page 3. On page 6, Simkiss teaches transformation time can be controlled by the choice of inhibitor and the choice of inhibitor concentration and/or solubility. A slow mechanism is taught is one required natural bone formation and repair mechanism. However, fast-setting material may be used depending on the intended use such as bone filling or bone-grafting. See page 6. X-ray diffraction patterns are seen in Figure 1.

Simkiss does not teach the recited setting time.

Brown et al disclose dental restorative cement pastes. The cements are used for conventional purposes, i.e. to fill a tooth socket, a replacement cone, a cement for implanting and replanting teeth, a material which promotes bone growth, etc. see column 9, lines 20-40. The composition is a mixture of two sparingly soluble calcium phosphates and a dilute aqueous solution. The combination hardens into dental cement when contacted with living tissue. See abstract. The CaP mix contains teteracalcium phosphate and at least one sparingly soluble calcium phosphate, i.e. dicalcium phosphate dehydrate or brushite. See column 3, lines 35-50. The composition may be in a slurry, gel, cement, or injectable form. See example 3. Table II provides the instant setting times. Brown et al disclose methods of manipulating setting times by adding a sizable amount of hydroxyapatite seed crystals to the paste to facilitate crystal formation. Further, crystal habit modifiers (up to 1%) such as magnesium, citrates, or

phosphonates may be used to promote expansion and adhesion. These modifiers absorb onto the specific sires of the crystal surfaces during growth affecting the morphology of the crystals. Further, appropriate combinations of varying particle sizes promote setting expansion. See column 9, line 55 to column 10, line 5. Example 3 further teaches the manipulation of the setting time. The rate of remineralization may also be adjusted which effects the body's ability to resorb the material. Therefore rapid mineralization is beneficial under some circumstances such as incipient dental caries and lesions. Slow mineralization is beneficial for deep lesions. See column 8, lines 25-47.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Simkiss et al and Brown et al and manipulate Simkiss's formulation to yield a fast-setting precursor material. One would be motivated so since Brown et al also teach a calcium phosphate injectable composition that has setting capabilities at physiological temperatures. Further, Brown provides guidance on how to manipulate the setting condition by changing the amount of hydroxyapatite, adding crystal modifiers such as magnesium, phosphonates, and citrates, which also taught by Simkiss for the same purpose of manipulating setting time. Therefore, it can be seen that manipulation of setting times is a conventional practice done in the art at the time the invention was made. Lastly, one would be motivated to manipulate the parameters of the prior art depending on the intended use of the implant and treatment plan as taught by both Simkiss and Brown et al.

Claims 1, 3, 7, 9-16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent 5,782,971 to Constantz et al.

Constantz et al teach a flowable amorphous calcium phosphate (ACP) composition capable of setting in vivo (endothermic process) into a shaped product. The paste contains in addition to ACP, a monocalcium phosphate (acidic calcium phosphate), and a liquid (sterile water). See column 4, lines 5-52 and column 5, lines 45-55. The paste like composition has approximately the crystallinity of natural bone. See column 2, lines 40-42 and lines 50-53. The calcium phosphate has a molar ratio about 1.5 to 1.8 and preferably 1.6 to 1.7. See column 3, lines 18-21. The compositions reabsorbed by the body from two weeks to 48 months. See column 6, lines 17-20. The setting time take at least about 10 minutes and not more than about 60 minutes. Instant setting times are taught in Table 1. The composition is used for a variety of purposes, i.e. connective tissue replacement, bone cementing, as a prosthetic implant, as a dental implant, as bone filler, as a means of bonding bone fragments together in a fracture, etc. see column 6, lines 55-66.

Constantz does not specify the x-ray differential pattern.

Although Constantz does not specify the x-ray pattern, it is deemed that Constantz's precursor material has similar if not the same, differential pattern as that of instant invention since applicant claims diffraction pattern of natural bone. It is the examiner's position this is an obvious pattern that would be known to one of ordinary skill in the art. One would be motivated to manipulate the precursor material, depending on the desired amount of hydroxapatite, which in turn determines the x-ray pattern.

Lastly, since the Patent Office is not capable of manufacturing products and testing them, the burden shifts to the applicant to prove that the instant property provides for an unexpected property and is distinguishable over the prior art.

Conclusion

No claims are allowed at this time.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharmila S. Gollamudi whose telephone number is 571-272-0614. The examiner can normally be reached on M-F (8:00-5:30), alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Kunz can be reached on 571-272-0887. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sharmila S. Gollamudi
Examiner
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SSG

Gary L. Kunz

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